

REMARKS

This application has been carefully reviewed in light of the Office Action dated May 23, 2002 (Paper No. 5). Claims 1 to 20 are in the application, with Claims 15 to 20 having been newly added herein. Claims 1, 7, 15 and 18 are the independent claims. Reconsideration and further examination are respectfully requested.

Figures 8 and 9B were objected to for allegedly not adequately depicting the polygon mirror 10. A Request For Approval Of Drawing Changes accompanies this Amendment in which approval is sought to modify Figures 8 and 9B to more clearly depict the polygon mirror 10. Approval of the Request and withdrawal of the objection to the drawings are respectfully requested.

The Abstract Of The Disclosure was objected to for excessive length. In response, Applicant has amended the Abstract to reduce the length.

Claim 12 was objected to under 37 C.F.R. § 1.75 for allegedly being a substantial duplicate of Claim 4. Applicant respectfully submits that Claim 12 does in fact differ substantially from Claim 4. Specifically, the first optical system of Claim 12 includes the feature of an over-filled scanning system in which the light beam emitted from the light source has a beam width wider than a deflection surface of the deflection means. Claim 4 does not include this feature and is therefore different from Claim 12. Withdrawal of the objection of Claim 12 under 37 C.F.R. § 1.75 is respectfully requested.

Claims 1 and 7 were rejected under 35 U.S.C. § 102(b) over U.S. Patent No. 5,161,047 (Tomita); Claims 2, 8, 10 and 11 were rejected under § 103(a) over Tomita; Claims 3 and 9 were rejected under § 103(a) over Tomita in view of U.S. Patent No.

6,288,818 (Yoshimaru); and Claims 4 to 6 and 12 to 14 were rejected under § 103(a) over Tomita in view of U.S. Patent No. 5,750,986 (Genovese). Applicant has carefully considered the Examiner's remarks and the applied references and respectfully submits that the claims herein are patentably distinguishable over the applied references for at least the following reasons.

The present invention concerns an optical scanning device in which an emitted light beam is deflected to scan an effective scanning area of a scanning surface. According to the invention, the light beam is continuously kept lit when scanning outside of the effective scanning area and a light shield member is positioned between a deflector and the scanning surface to block at least a portion of the light beam emitted during that period of time. In this manner, the present invention reduces delays associated with the rise time of the light source and controls flare light from the light beam.

With reference to particular claim language, independent Claim 1 concerns an optical scanning device that includes a first optical system, including a light source, for directing a light beam emitted from the light source to deflection means. A second optical system focuses the light beam deflected by the deflection means on an effective scanning area of a scanning surface. The light source is continuously kept lit when scanning outside of the effective scanning area. A light shield member is positioned between the deflection means and the scanning surface to block at least a portion of the light beam emitted during the period of time when the light source is continuously kept lit when scanning outside of the effective scanning area.

Independent Claim 7 concerns an optical scanning device that includes a first optical system, including a light source, for directing a light beam emitted from the light source to a deflection surface of deflection means in a beam width wider than the width of the deflection surface in a main scan direction. A second optical system focuses the light beam deflected by the deflection means on an effective scanning area of a scanning surface. The light source is continuously kept lit when scanning outside of the effective scanning area. A light shield member is positioned between the deflection means and the scanning surface to block at least a portion of the light beam emitted during the period of time when the light source is continuously kept lit when scanning outside of the effective scanning area.

The applied references are not understood to disclose the foregoing features of the present invention. In particular, the applied references are not understood to disclose at least the feature of keeping the light source lit when scanning outside of the effective scanning area of a scanning surface.

Tomita concerns an optical scanner in which a laser beam is deflected and focused on a target surface. Tomita is understood to disclose a configuration for blocking portions of light diffracted by an aperture member from reaching the target surface. However, Tomita is not understood to disclose keeping the light or laser beam continuously lit when not being focused on the target surface. Therefore, Tomita is not understood to disclose at least the feature of keeping the light source lit when scanning outside of the effective scanning area of a scanning surface.

Yoshimaru and Genovese, which were applied in the rejection of certain other claims, are not understood to disclose or suggest anything to remedy the foregoing deficiencies of Tomita. Specifically, Yoshimaru concerns an optical scanning apparatus and was cited in the Office Action for its disclosure of emitting a light beam that is incident at an oblique angle to a deflection surface. Genovese concerns the detection of the start of scanning and the regulation of beam intensity for a multiple laser beam scanner using a single photodetector and was cited for its disclosure of a photosensitive body together with development, transfer and fixing means. However, neither Yoshimaru nor Genovese are understood to disclose at least the feature of keeping a light beam lit when scanning outside of the effective scanning area of a scanning surface.

Independent Claim 7 also concerns an over-filled scanning device in which the light beam emitted from the light source is directed to a deflection surface of deflection means in a beam width wider than the width of the deflection surface in a main scan direction. The applied references, namely Tomita, Yoshimaru and Genovese, are not understood to disclose this feature of directing a light beam emitted from a light source to a deflection surface in a beam width wider than the deflection surface.

For the foregoing reasons, independent Claims 1 and 7 are believed to be allowable over the applied references. Reconsideration and withdrawal of the § 102(b) rejection of Claims 1 and 7 are respectfully requested.

New independent Claim 15 concerns an optical scanning device comprising a first optical system, including a light source, for directing a light beam emitted from the light source to deflection means. A second optical system focuses the light beam deflected

by the deflection means on an effective scanning area of a scanning surface. The light source is continuously kept lit when scanning outside of an effective scanning area.

New independent Claim 18 concerns an optical scanning device comprising a first optical system, including a light source, for directing a light beam emitted from the light source to a deflection surface of deflection means in a beam width wider than the width of the deflection surface in a main scan direction. A second optical system focuses the light beam deflected by the deflection means on an effective scanning area of a scanning surface. The light source is continuously kept lit when scanning outside of an effective scanning area.

As discussed above with respect to independent Claims 1 and 7, the applied references, namely Tomita, Yoshimaru and Genovese, either alone or in combination, are not understood to disclose or suggest at least the feature of keeping the light source lit when scanning outside of the effective scanning area of a scanning surface. Therefore, independent Claims 15 and 18 are also believed to be allowable over the applied references.

The other claims in the application are dependent from the independent claims discussed above and are therefore believed to be allowable over the applied references for at least the same reasons. Because each dependent claim is deemed to define an additional aspect of the invention, however, the individual consideration of each on its own merits is respectfully requested.

In view of the foregoing amendment and remarks, the entire application is believed to be in condition for allowance and such action is respectfully requested at the Examiner's earliest convenience.

Applicant's undersigned attorney may be reached in our Costa Mesa, California, office by telephone at (714) 540-8700. All correspondence should be directed to our address given below.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES TO THE ABSTRACT OF THE
DISCLOSURE

The Abstract Of The Disclosure has been amended as follows:

An optical scanning device includes a first optical system, including a light source, for directing a light beam, emitted from the light source, to an optical deflector[, and a] A second optical system [for focusing] focuses the light beam[, reflected and] deflected by the deflector[,] on an effective scanning area of a scanning surface[, thereby scanning a plurality of lines on the effective scanning area, wherein the] The light source is continuously kept [remains] lit [during a period of time between the] when scanning outside of [each of the plurality of lines on] the effective scanning area. [and wherein a] A light shield member is positioned between the deflector and the scanning surface to block at least a portion of the light beam emitted during the period of time when the light source is continuously kept lit when [between the] scanning outside of [each of the plurality of lines on] the effective scanning area. [The optical scanning device thus improves the detection accuracy of an image write start position and the stability of the output of light source, thereby presenting a good quality image.]

VERSION WITH MARKINGS TO SHOW CHANGES MADE TO CLAIMS

1. (Amended) An optical scanning device comprising:

a first optical system, including a light source, for directing a light beam emitted from the light source to deflection means; and

a second optical system for focusing the light beam[, reflected and] deflected by the deflection means[,] on an effective scanning area of a scanning surface[, thereby scanning a plurality of lines on the effective scanning area],

wherein the light source is continuously kept [remains] lit [during a period of time between the] when scanning outside of [each of the plurality of lines on] the effective scanning area and wherein a light shield member is positioned between the deflection means and the scanning surface to block at least a portion of the light beam emitted during the period of time when the light source is continuously kept lit when [between the] scanning outside of [each of the plurality of lines on] the effective scanning area.

4. (Amended) An image forming apparatus comprising:

an optical scanning device according to claim 1 [including a first optical system, including a light source, for directing a light beam emitted from the light source to deflection means, and a second optical system for focusing the light beam, reflected and

deflected by the deflection means, on an effective scanning area of a scanning surface, thereby scanning a plurality of lines on the effective scanning area, wherein the light source remains lit during a period of time between the scanning of each of the plurality of lines on the effective scanning area and wherein a light shield member is positioned between the deflection means and the scanning surface to block at least a portion of the light beam emitted during the period of time between the scanning of each of the plurality of lines on the effective scanning area];

a photoconductive body arranged on the scanning surface of said optical scanning device;

[a] development means for developing, into a toner image, an electrostatic latent image that has been formed with the light beam scanning [the] said photoconductive body;

[a] transfer means for transferring the developed toner image onto a paper sheet; and

[a] fixing means for fixing the transferred toner image onto the paper sheet.

5. (Amended) An image forming apparatus comprising:

an optical scanning device according to claim 1 [including a first optical system, including a light source, for directing a light beam emitted from the light source to deflection means, and a second optical system for focusing the light beam, reflected and deflected by the deflection means, on an effective scanning area of a scanning surface, thereby scanning a plurality of lines on the effective scanning area, wherein the light source remains lit during a period of time between the scanning of each of the plurality of lines on

the effective scanning area and wherein a light shield member is positioned between the deflection means and the scanning surface to block at least a portion of the light beam emitted during the period of time between the scanning of each of the plurality of lines on the effective scanning area]; and

a printer controller for converting code data input from an external device into an image signal and feeding the image signal to said optical scanning device.

7. (Amended) An optical scanning device comprising:

a first optical system, including a light source, for directing a light beam emitted from the light source to a deflection surface of deflection means in a beam width wider than the width of the deflection surface in a main scan direction; and

a second optical system for focusing the light beam, [reflected and] deflected by the deflection means[,], on an effective scanning area of a scanning surface[, thereby scanning a plurality of lines on the effective scanning area],

wherein the light source is continuously kept [remains] lit [during a period of time between the] when scanning outside of [each of the plurality of lines on] the effective scanning area and wherein a light shield member is positioned between the deflection means and the scanning surface to block at least a portion of the light beam emitted during the period of time when the light source is continuously kept lit when [between the] scanning outside of [each of the plurality of lines on] the effective scanning area.

10. (Amended) An image forming apparatus comprising an optical scanning device according to claim 7 [including a first optical system, including a light source, for directing a light beam emitted from the light source to a deflection surface of deflection means in a beam width wider than the width of the deflection surface in a main scan direction, and a second optical system for focusing the light beam, reflected and deflected by the deflection means, on an effective scanning area of a scanning surface, thereby scanning a plurality of lines on the effective scanning area, wherein the light source remains lit during a period of time between the scanning of each of the plurality of lines on the effective scanning area and wherein a light shield member is positioned between the deflection means and the scanning surface to block at least a portion of the light beam emitted during the period of time between the scanning of each of the plurality of lines on the effective scanning area], [and]

wherein the width of a border area between adjacent deflection surfaces of the deflection means in a main scan direction is 1% or less of the width of each deflection surface in the main scan direction.

11. (Amended) An image forming apparatus comprising an optical scanning device according to claim 7 [including a first optical system, including a light source, for directing a light beam emitted from the light source to a deflection surface of deflection means in a beam width wider than the width of the deflection surface in a main scan direction, and a second optical system for focusing the light beam, reflected and deflected by the deflection means, on an effective scanning area of a scanning surface, thereby scanning a plurality of lines on the effective scanning area, wherein the light source

remains lit during a period of time between the scanning of each of the plurality of lines on the effective scanning area and wherein a light shield member is positioned between the deflection means and the scanning surface to block at least a portion of the light beam emitted during the period of time between the scanning of each of the plurality of lines on the effective scanning area], [and]

wherein in a border area between adjacent deflection surfaces of the deflection means, one deflection surface extends over the other deflection surface, and the length of the extension in a main scan direction is 5% or less of the beam width of the light beam reflected and deflected from the deflection surface in the main scan direction.

12. (Amended) An image forming apparatus comprising:

an optical scanning device according to claim 7 [including a first optical system, including a light source, for directing a light beam emitted from the light source to a deflection surface of deflection means in a beam width wider than the width of the deflection surface in a main scan direction, and a second optical system for focusing the light beam, reflected and deflected by the deflection means, on an effective scanning area of a scanning surface, thereby scanning a plurality of lines on the effective scanning area, wherein the light source remains lit during a period of time between the scanning of each of the plurality of lines on the effective scanning area and wherein a light shield member is positioned between the deflection means and the scanning surface to block at least a portion of the light beam emitted during the period of time between the scanning of each of the plurality of lines on the effective scanning area];

a photoconductive body arranged on the scanning surface of said optical scanning device;

[a] development means for developing, into a toner image, an electrostatic latent image that has been formed with the light beam scanning said photoconductive body;

[a] transfer means for transferring the developed toner image onto a paper sheet; and

[a] fixing means for fixing the transferred toner image onto the paper sheet.

13. (Amended) An image forming apparatus comprising:

an optical scanning device according to claim 7 [including a first optical system, including a light source, for directing a light beam, emitted from the light source to a deflection surface of deflection means in a beam width wider than the width of the deflection surface in a main scan direction, and a second optical system for focusing the light beam, reflected and deflected by the deflection means, on an effective scanning area of a scanning surface, thereby scanning a plurality of lines on the effective scanning area, wherein the light source remains lit during a period of time between the scanning of each of the plurality of lines on the effective scanning area and wherein a light shield member is positioned between the deflection means and the scanning surface to block at least a portion of the light beam emitted during the period of time between the scanning of each of the plurality of lines on the effective scanning area]; and

a printer controller for converting code data input from an external device into an image signal and feeding the image signal to said optical scanning device.